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EXAMINER  
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ART UNIT	PAPER NUMBER
2813	

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/619,477

Applicant(s)

YAMAZAKI, SHUNPEI

Examiner

Erik Kielin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1) ☒ Responsive to communication(s) filed on 21 July 2003.

2a) ☒ This action is **FINAL**.

2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4) ☒ Claim(s) 1-10, 12-33, 35-44 and 46-56 is/are pending in the application.

4a) Of the above claim(s) 1-10, 12-30 and 54 is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 31-33, 35-44, 46-53, 55 and 56 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some \* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_

4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

### DETAILED ACTION

This action responds to the Amendment filed 2 July 2002 (Paper no. 16) and the Supplemental Amendment filed 21 July 2003 (Paper no. 17). Examiner notes with interest that the claims have been dramatically broadened.

#### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 31-33, 35, 39, 42, 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,169,593 B1 (**Kanaya et al.**) in view of JP 9-251996 (**Yamazaki et al.**).

Regarding claim 31, **Kanaya** discloses a liquid crystal display --as further limited by instant claim 42-- comprising a first substrate **20** having a circuit structured with a thin film transistor (TFT); a second substrate (Fig. 4A called "ICs for driving the gate electrode") opposing said first substrate **20**; a connecting wire formed of a metallic film **22** (gate signal wire; col. 8, lines 25-29) and a transparent conductive film (TCF) **28** (source signal wire; col. 8, ll. 50-51) in contact with the metallic film surface for connecting said circuit structured with a TFT to another circuit; and a protecting film **24** in contact with a side surface of said metallic film and formed along with a longer side and a shorter side of the metallic film, wherein said connecting wiring and said protecting film **24** are formed over said first substrate **20**. (See Figs. 2G and 2H; col. 9, ll. 13-40. See also col. 18, ll. 24-51 and Figs. 15A-15B.) Note that the protecting film **24**

is the same film insulating between **22** and **28** as shown in Fig. 2F --as further limited by instant claim 32).

In another embodiment as shown in Figs. 7E-7F, **Kanaya** discloses the metal film **26** of about 300 nm (col. 13, lines 37-40) with overlying TCF **28** of a thickness of about 70 nm (col. 9, line 25) --as further limited by instant claim 35-- and protecting film **30** formed of, for example, an acrylic resin -- as further limited by instant claim 34-- and formed along the length and width direction of the lamination film and contacting a side surface of the metal film **26**. (See also col. 14 -- esp. ll. 7-10, 45-67; Figs 12D, 13B.)

**Kanaya** does not teach that the wiring has a tapered shape.

**Yamazaki** teaches that contact holes are conventionally required to be tapered to improve the step coverage of upper-layer wiring lines at contact holes (paragraph [0003] first sentence).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to form the connecting wiring of **Kanaya** to have a tapered shape, as taught in **Yamazaki** because **Yamazaki** teaches that tapering is conventional and required to improve step coverage.

Regarding claim 33, **Kanaya** shows the connection wiring is connected to a wiring **19** (Fig. 2H; also called "output terminal" in Figs. 4A-4B) of a third substrate **21** via an anisotropic conductive film **80a**.

Regarding claim 55, **Kanaya** discloses the lamination film is formed of the same materials as the source and drain wiring. (See col. 13, lines 32-36 and especially the paragraph bridging cols. 14-15.)

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3. Claims **31-33**, **35-37**, **42**, **55** are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,636,329 (**Sukegawa et al**) in view of JP 9-251996 (**Yamazaki et al.**).

The prior art Fig. 2A-2C of **Sukegawa** showing a terminal portion of an LCD display discloses a first substrate **1** having a circuit structured with a thin film transistor (TFT); a second substrate (called the "color filter substrate **200**" Fig. 3A; col. 5, lines 27-44) opposing said first substrate **1**; a connecting wire formed of a metallic film **7** and a transparent conductive film (TCF) **8** of 40 nm thick (col. 5, lines 6-10) in contact with the metallic film surface for connecting said circuit structured with a TFT to another circuit using an anisotropic conductive film (ACF) **10**; and a protecting film **3** in contact with a side surface of said metallic film **7**, wherein said connecting wiring and said protecting film **7** is formed over said first substrate **1** and formed along with a longer side and a shorter side of the metallic film. (See also col. 3, ll. 9-33 and prior art Figs. 1A-1B.)

Fig. 4A-4B of **Sukegawa** discloses a first substrate **1** having a circuit structured with a thin film transistor (TFT); a second substrate **200** opposing said first substrate **1**; a connecting wire formed of a metallic film **7** formed 140 nm thick from Cr, Al, W, etc. (col. 8, ll. 59-63) and a transparent conductive film (TCF) **8** in contact with the metallic film surface for connecting said circuit structured with a TFT (Fig. 3C) to another circuit using an anisotropic conductive film (ACF) **10**; and a protecting film **3** in contact with a side surface of said metallic film **7**, wherein said connecting wiring and said protecting film **7** are formed over said first substrate **1**, and formed along the length direction of the lamination film. Note also that at col. 7, ll. 40-44, **Sukegawa** states, "That is, the upper layer metal wiring **7** is protected at least by double

coverage with a transparent conductive film **10** and further protected, locally, by coverage with a protective insulation film **9**. (See also col. 3, ll. 9-33 and prior art Figs. 1A-1B.)

**Sukegawa** does not teach that the wiring has a tapered shape.

**Yamazaki** teaches that contact holes are conventionally required to be tapered to improve the step coverage of upper-layer wiring lines at contact holes (paragraph [0003] first sentence).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to form the connecting wiring of **Sukegawa** to have a tapered shape, as taught in **Yamazaki** because **Yamazaki** teaches that tapering is conventional and required to improve step coverage.

Regarding claim 33, **Sukegawa** discloses the connection wiring is connected to a wiring **31a**, **31b** of a third substrate via an anisotropic conductive film (Fig. 3E).

Regarding claim 55, **Sukegawa** discloses the lamination film is formed of the same materials as the source and drain wiring. (See Fig. 3C and associated text.)

4. Claims **31-33**, **35-37**, **39**, **42**, **55** are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,608,559 (**Inada et al.**) in view of JP 9-251996 (**Yamazaki et al.**).

The prior art Fig. 2 of **Inada**, showing a terminal portion of an LCD panel, discloses a first substrate **221** having a circuit structured with a thin film transistor (TFT); a second substrate opposing said first substrate **204** which is a flexible wiring substrate; a connecting wire formed of a 300-nm thick metallic film **209** formed at and a 80-nm thick transparent conductive film (TCF) **210** in contact with the metallic film surface for connecting said circuit structured with a TFT to another circuit using an anisotropic conductive film (ACF) **211**; and a protecting film **211**

in contact with a side surface of said metallic film **209**, wherein said connecting wiring and said protecting film **211** is formed along with a longer side and a shorter side of the metallic film and is formed over said first substrate **221**. (See col. 1, ll. 29-34.)

Fig. 6 of **Inada** discloses a similar embodiment to the prior art figure but shows the protective film **42** of silicon nitride on the side of, and formed along the length and width direction of, the lamination film formed of the 300-nm thick metal film **29** with overlying 80-nm thick transparent conductive film **30** and anisotropic conductive film **36** (col. 8, ll. 50-51). (See also col. 7, ll. 10-30; col. 14, ll. 32-42; col. 4, ll. 24-34).

**Inada** does not teach that the wiring has a tapered shape.

**Yamazaki** teaches that contact holes are conventionally required to be tapered to improve the step coverage of upper-layer wiring lines at contact holes (paragraph [0003] first sentence).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to form the connecting wiring of **Inada** to have a tapered shape, as taught in **Yamazaki** because **Yamazaki** teaches that tapering is conventional and required to improve step coverage.

Regarding claim 32, **Inada** discloses that protective film **310** between source/drain wiring is that same as protective film **42** which are each SiN (Fig. 14; col. 14, lines 32-42).

Regarding claim 33, **Inada** discloses the connection wiring is connected to a wiring **35** of a third substrate **33** via an anisotropic conductive film **36** (Fig. 6).

Regarding claim 55, **Inada** discloses the lamination film is formed of the same materials as the source and drain wiring. (See Fig. 14 and associated text.)

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5. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of **Kanaya** in view **Yamazaki**, **Sukegawa** in view **Yamazaki**, and **Inanda** in view **Yamazaki**, each as applied to claim 31 above, and further in view of US 5,821,159 (**Ukita**).

Each of **Kanaya** in view **Yamazaki**, **Sukegawa** in view **Yamazaki**, and **Inanda** in view **Yamazaki**, as explained above, teaches each of the features of the claims except for forming the metallic film as a laminate of tungsten W and tungsten nitride compound  $WN_x$ . **Kanaya** does however teach an example of another refractory metallic film as a laminate of tantalum/tantalum nitride or Ta/TaN (col. 17, ll. 44-48).

**Ukita** discloses that it is known in the LCD art to make a metallic film for an interconnection wiring as a laminate of a tungsten and its nitride (col. 4, lines 21-25). It has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960).

It would have been obvious to one of ordinary skill at the time of the invention to use a tungsten and its nitride to form the metallic film of any of **Kanaya**, **Sukegawa**, and **Inada** as taught in **Ukita** because, in the case of **Kanaya**, **Kanaya** discloses a similar laminate of another refractory metal and because tungsten and its nitride would be expected to work just as well as the other metallic films for interconnect wiring, according to precedent.

6. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of **Kanaya** in view **Yamazaki**, **Sukegawa** in view **Yamazaki**, and **Inanda** in view **Yamazaki**, each as applied to claim 31 above, and further in view of US 6,215,077 B1 (**Utsumi et al.**).



Each of **Kanaya** in view **Yamazaki**, **Sukegawa** in view **Yamazaki**, and **Inanda** in view **Yamazaki**, as explained above, teaches each of the features of the claims except for forming the transparent conductive film from zinc oxide and compounds of zinc oxide and indium oxide.

**Utsumi** teaches the benefits of using a laminate of a metallic film 2b, 2c comprising aluminum layer 2b with overlying IZO 2a specifically for use on transparent substrates for LCDs. (See Abstract, col. 2, l. 45 to col. 3, l. 16; and especially col. 4, ll. 49-58.)

It would have been obvious to one of ordinary skill at the time of the invention to use the metallization scheme of **Utsumi** for the reasons in **Utsumi** -- at least to form a metallization free from hillocks which has a low resistance even though it incorporates a conductive metal oxide.

Moreover, it has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960). It would have been obvious to one of ordinary skill at the time of the invention to use zinc oxide or zinc oxide and indium oxide to form the transparent conductive film of any of **Kanaya**, **Sukegawa**, and **Inada** as taught in **Utsumi** because either material would be expected to work just as well as the transparent conductive films of each of **Kanaya**, **Sukegawa**, and **Inada** for interconnect wiring, according to precedent.

7. Claims 43, 44, 46, 50, 53, 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kanaya** in view of **Yamazaki** and JP 8-234212 A (**Hioki**).

**Kanaya** in view of **Yamazaki**, as explained above, teaches each of the features of the claims except for forming column-shaped spacers over the TFTs, wherein the material used to form the spacers is the same material as that used to form the protective film.

**Hioki** teaches the benefits of forming column-shaped spacers **24** over the TFTs **22** using a resin. It would have been obvious to one of ordinary skill at the time of the invention to form spacers over the TFTs of **Hioki** and form them from resin for the reasons indicated in **Hioki** -- especially because forming the spacers over the TFTs provides uniform light over the pixels.

Because **Kanaya** teaches embodiments wherein the protecting film material is made from resin, both the spacers and the protecting film are formed from the same material.

8. Claims **43**, **44**, **46-48**, **53**, **56** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sukegawa** in view of **Yamazaki** and **Hioki**.

**Sukegawa** in view of **Yamazaki**, as explained above, teaches each of the features of the claims except for forming column-shaped spacers over the TFTs, wherein the material used to form the spacers is the same material as that used to form the protective film.

**Hioki** teaches the benefits of forming column-shaped spacers **24** over the TFTs **22** using a resin. It would have been obvious to one of ordinary skill at the time of the invention to form spacers over the TFTs of **Hioki** and form them from resin for the reasons indicated in **Hioki** -- especially because forming the spacers over the TFTs provides uniform light over the pixels.

Because **Sukegawa** teaches embodiments wherein the protecting film material is made from resin, both the spacers and the protecting film are formed from the same material.

9. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of **Kanaya** in view **Yamazaki** and **Hioki**, **Sukegawa** in view **Yamazaki** and **Hioki**, and **Inanda** in view **Yamazaki** and **Hioki**, each as applied to claim 43 above, and further in view of US 5,821,159 (**Ukita**).

Each of **Kanaya** in view **Yamazaki** and **Hioki**, **Sukegawa** in view **Yamazaki** and **Hioki**, and **Inanda** in view **Yamazaki** and **Hioki**, as explained above, teaches each of the features of the claims except for forming the metallic film as a laminate of tungsten W and tungsten nitride compound  $WN_x$ . **Kanaya** does however teach an example of another refractory metallic film as a laminate of tantalum/tantalum nitride or Ta/TaN (col. 17, ll. 44-48).

**Ukita** discloses that it is known in the LCD art to make a metallic film for an interconnection wiring as a laminate of a tungsten and its nitride (col. 4, lines 21-25). It has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960).

It would have been obvious to one of ordinary skill at the time of the invention to use a tungsten and its nitride to form the metallic film of any of **Kanaya**, **Sukegawa**, and **Inada** as taught in **Ukita** because, in the case of **Kanaya**, **Kanaya** discloses a similar laminate of another refractory metal and because tungsten and its nitride would be expected to work just as well as the other metallic films for interconnect wiring, according to precedent.

10. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of **Kanaya** in view **Yamazaki** and **Hioki**, **Sukegawa** in view **Yamazaki** and **Hioki**, and **Inanda** in

view **Yamazaki** and **Hioki**, each as applied to claim 43 above, and further in view of US 6,215,077 B1 (**Utsumi** et al.).

Each of **Kanaya** in view **Yamazaki** and **Hioki**, **Sukegawa** in view **Yamazaki** and **Hioki**, and **Inanda** in view **Yamazaki** and **Hioki**, as explained above, teaches each of the features of the claims except for forming the transparent conductive film from zinc oxide and compounds of zinc oxide and indium oxide.

**Utsumi** teaches the benefits of using a laminate of a metallic film 2b, 2c comprising aluminum layer 2b with overlying IZO 2a specifically for use on transparent substrates for LCDs. (See Abstract, col. 2, l. 45 to col. 3, l. 16; and especially col. 4, ll. 49-58.)

It would have been obvious to one of ordinary skill at the time of the invention to use the metallization scheme of **Utsumi** for the reasons in **Utsumi** -- at least to form a metallization free from hillocks which has a low resistance even though it incorporates a conductive metal oxide.

Moreover, it has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960). It would have been obvious to one of ordinary skill at the time of the invention to use zinc oxide or zinc oxide and indium oxide to form the transparent conductive film of any of **Kanaya**, **Sukegawa**, and **Inada** as taught in **Utsumi** because either material would be expected to work just as well as the transparent conductive films of each of **Kanaya**, **Sukegawa**, and **Inada** for interconnect wiring, according to precedent.

***Response to Arguments***

11. Applicant's arguments filed 2 July 2003 (Paper no. 16) have been fully considered but they are not persuasive.

Applicant argues that the applied reference of Yamazaki et al. JP 9-251996 indicates only that the contact hole should be tapered. Examiner requests Applicant to explain how a metal wiring in a tapered hole is somehow not taking on the tapered shape of the hole, as very clearly shown in all of the drawings in the Yamazaki reference. Accordingly the argument is wholly without merit.

Applicant argues that there "has been an insufficient showing that one of skill in the art would have been motivated to combine and/or modify the reference teachings to achieve the present invention. Yet Applicant in the same paragraph of the arguments recites from the Yamazaki reference the same passage as did Examiner that such tapering is required. The strongest rationale for combining references is a recognition, expressly or impliedly in the prior art or drawn from a convincing line of reasoning based on established scientific principles or legal precedent, that some advantage or expected beneficial result would have been produced by their combination. *In re Sernaker*, 702 F.2d 989, 994-95, 217 USPQ 1, 5-6 (Fed. Cir. 1983). Moreover, Applicant's argument is defective for failing to point out what exactly is wrong with the combination of references. Such absence of argument amounts to a mere pleading. Accordingly, this argument is wholly without merit.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

JP 4-133027 A (**Yamazaki et al.**) teaches the use of zinc oxide and compounds of zinc oxide and indium oxide to form transparent conductive wiring for an optical display device (Abstract).

JP 9-213968 (**Chiyou**, assigned to **Semiconductor Energy Lab.**) and US 5,849,611 (**Yamazaki et al.**) each disclose the methods and benefits of forming a tapered wiring structure.

US 5,648,674 (**Weisfield et al.**; col. 2, lines 40-46), US 5,208,690 (**Hayashi et al.**; Figs. 7 and 8 and associated text), US 5,835,177 (**Dohjo et al.**; at least Fig. 3), US 5,734,458 (**Ikubo et al.**), and US 6,226,060 B1 (**Onisawa et al.**) each teaches the methods and benefits of forming a tapered wiring structure.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,


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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Erik Kielin  
Primary Examiner  
October 13, 2003